

### AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all prior listings and versions:

1. (withdrawn) An isolated, non-canonical zinc finger binding protein encoded by the polynucleotide of claim 30 ~~comprising one or more non-canonical zinc finger components that bind to a target sequence.~~
2. (previously presented) The isolated polynucleotide of claim 30, wherein the target sequence is a nucleic acid sequence.
3. (withdrawn) The isolated polynucleotide of claim 30, wherein the target sequence is an amino acid sequence.
4. (previously presented) The isolated polynucleotide of claim 2, wherein the target sequence is DNA.
5. (withdrawn) The isolated polynucleotide of claim 2, wherein the target sequence is RNA.
6. (currently amended) The isolated polynucleotide of claim 30, wherein the amino acid sequence of ~~one or more of the~~ non-canonical zinc finger ~~components~~ component is selected from the group consisting of: X<sub>3</sub>-B-X<sub>2-4</sub>-Cys-X<sub>12</sub>-His-X<sub>1-7</sub>-His-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-B-X<sub>12</sub>-His- X<sub>1-7</sub>-His-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-Cys-X<sub>12</sub>-Z-X<sub>1-7</sub>-His-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-Cys-X<sub>12</sub>-His-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-B-X<sub>2-4</sub>-B-X<sub>12</sub>-His-X<sub>1-7</sub>-His-X<sub>4</sub>; X<sub>3</sub>-B-X<sub>2-4</sub>-Cys-X<sub>12</sub>-Z-X<sub>1-7</sub>-His-X<sub>4</sub>; X<sub>3</sub>-B-X<sub>2-4</sub>-Cys-X<sub>12</sub>-His-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-B-X<sub>12</sub>-Z-X<sub>1-7</sub>-His-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-B-X<sub>12</sub>-His-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-Cys-X<sub>12</sub>-Z-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-Cys-X<sub>2-4</sub>-B-X<sub>12</sub>-Z-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-B-X<sub>2-4</sub>-Cys-X<sub>12</sub>-Z-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-B-X<sub>2-4</sub>-B-X<sub>12</sub>-His-X<sub>1-7</sub>-Z-X<sub>4</sub>; X<sub>3</sub>-B-X<sub>2-4</sub>-B-X<sub>12</sub>-Z-X<sub>1-7</sub>-His-X<sub>4</sub>; and X<sub>3</sub>-B-X<sub>2-4</sub>-B-X<sub>12</sub>-Z-X<sub>1-7</sub>-Z-X<sub>4</sub>, wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.
7. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence X<sub>3</sub>-B-X<sub>2-4</sub>-Cys-X<sub>12</sub>-His-X<sub>1-7</sub>-His-X<sub>4</sub>, wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

8. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2.4}\text{-B-X}_{12}\text{-His-X}_{1.7}\text{-His-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

9. (withdrawn): The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2.4}\text{-Cys-X}_{12}\text{-Z-X}_{1.7}\text{-His-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

10. (currently amended) The isolated polynucleotide of claim 6, wherein the non-canonical zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2.4}\text{-Cys-X}_{12}\text{-His-X}_{1.7}\text{-Z-X}_4$ , wherein X is any amino acid, ~~B is any amino acid except cysteine~~ and Z is any amino acid except histidine.

11. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2.4}\text{-B-X}_{12}\text{-His-X}_{1.7}\text{-His-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

12. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2.4}\text{-Cys-X}_{12}\text{-Z-X}_{1.7}\text{-His-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

13. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2.4}\text{-Cys-X}_{12}\text{-His-X}_{1.7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

14. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2.4}\text{-B-X}_{12}\text{-Z-X}_{1.7}\text{-His-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

15. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2-4}\text{-B-X}_{12}\text{-His-X}_{1-7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

16. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2-4}\text{-Cys-X}_{12}\text{-Z-X}_{1-7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

17. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-Cys-X}_{2-4}\text{-B-X}_{12}\text{-Z-X}_{1-7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

18. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2-4}\text{-Cys-X}_{12}\text{-Z-X}_{1-7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

19. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2-4}\text{-B-X}_{12}\text{-His-X}_{1-7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

20. (withdrawn) The isolated polynucleotide of claim 6, wherein the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2-4}\text{-B-X}_{12}\text{-Z-X}_{1-7}\text{-His-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

21. (withdrawn) The isolated polynucleotide of claim 6, the zinc finger component comprises the sequence  $X_3\text{-B-X}_{2-4}\text{-B-X}_{12}\text{-Z-X}_{1-7}\text{-Z-X}_4$ , wherein X is any amino acid, B is any amino acid except cysteine and Z is any amino acid except histidine.

22. (previously presented) The isolated polynucleotide of claim 30, wherein the target sequence is in a plant cell.

23. (withdrawn) The isolated polynucleotide of claim 30, wherein the target sequence is in an animal cell.

24. (withdrawn) The isolated polynucleotide of claim 23, wherein the target sequence is in a human cell.

25. (previously presented) The isolated polynucleotide of claim 30, wherein the target sequence is a promoter sequence.

26. (previously presented) The isolated polynucleotide of claim 30, comprising three zinc finger components.

27. (previously presented) The isolated polynucleotide of claim 30, wherein the target sequence comprises about 9 to about 14 contiguous base pairs.

28. (currently amended) The isolated polynucleotide of claim 26, wherein the third zinc finger component comprises a non-canonical zinc finger component.

29. (cancelled)

30. (currently amended) An isolated polynucleotide encoding a non-naturally-occurring zinc-finger binding protein comprising ~~one or more non-C2H2~~ a non-canonical zinc finger component, wherein:

(i) said non-canonical zinc finger component contains a beta turn comprising the two amino-terminal zinc coordinating residues and an alpha helix comprising the two carboxy-terminal zinc coordinating residues, and

(ii) the zinc-coordinating residues of said non-canonical zinc finger component do not consist of two cysteine residues and two histidine residues; and  
wherein the protein is ~~designed~~ engineered bind to a target sequence.

31. (original) An expression vector comprising the polynucleotide of claim 30.

32. (original) A host cell comprising the polynucleotide of claim 30.

33. (withdrawn) A fusion polypeptide comprising: (a) an isolated zinc finger binding protein according to claim 1 and (b) at least one functional domain.

34. (withdrawn) The polynucleotide of claim 39, wherein the functional domain is a repressive domain.

35. (withdrawn) The polynucleotide of claim 34, wherein the repressive domain is selected from the group consisting of KRAB, MBD-2B, v-ErbA, MBD3, TR and members of the DNMT family.

36. (previously presented) The polynucleotide of claim 39, wherein the functional domain is an activation domain.

37. (previously presented) The polynucleotide of claim 36, wherein the activation domain is selected from the group consisting of maize C1, VP16, p65 subunit of NF-kappa B, and VP64.

38. (withdrawn) The polynucleotide of claim 39, wherein the functional domain is ~~selected from the group consisting of an insulator domain, a chromatin remodeling protein or a methyl-binding domain~~ an endonuclease.

39. (currently amended) An isolated polynucleotide ~~encoding a fusion polypeptide, wherein the fusion polypeptide comprises: (a) a zinc finger binding protein according to claim 30 and (b)~~ further encoding a functional domain.

40. (original) An expression vector comprising the polynucleotide of claim 39.

41. (original) A host cell comprising the polynucleotide of claim 39.

42. (withdrawn) A method of modulating expression of a gene, the method comprising the step of contacting a ~~region of DNA~~ cell with a polynucleotide according to claim 39.

43. (withdrawn) The method of claim 42, wherein the zinc finger binding protein of the fusion molecule binds to a target site in a gene encoding a product selected from the group consisting of gamma-tocopherol methyl transferase (GMT), vascular

endothelial growth factor, erythropoietin, androgen receptor, PPAR- $\gamma$ 2, p16, p53, pRb, dystrophin and e-cadherin.

44. (withdrawn) The method of claim 42, wherein the functional domain comprises a repressive domain.

45. (withdrawn) The method of claim 44, wherein the repressive domain is selected from the group consisting of KRAB, MBD-2B, v-ErbA, MBD3, TR and members of the DNMT family.

46. (withdrawn) The method of claim 42, wherein the functional domain comprises an activation domain.

47. (withdrawn) The method of claim 46, wherein the activation domain is selected from the group consisting of maize C1, VP16, p65 subunit of NF-kappa B, and VP64.

48. (withdrawn) The method of claim 42, wherein the functional domain is ~~selected from the group consisting of an insulator domain, a chromatin remodeling protein or a methyl-binding domain~~ an endonuclease.

49. (withdrawn) The method of claim 42, wherein the gene is in a plant cell.

50. (withdrawn) The method of claim 42, wherein the gene is in an animal cell.

51. (withdrawn) The method of claim 50, wherein the gene is in a human cell.

52. (withdrawn) A pharmaceutical composition comprising a non-naturally-occurring zinc-finger binding protein according to claim 1; ~~wherein the zinc finger binding protein:~~

~~(a) comprises one or more non-C2H2 zinc finger components, and~~

~~(b) is designed bind to a target sequence; and~~

a pharmaceutically acceptable excipient.

**53. (new)** A pharmaceutical composition comprising a polynucleotide according to claim 39 and a pharmaceutically acceptable excipient.